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so great in the lower Salt River and San Y Sidro-Zia regions, New Mexico, that the cactus and yucca plants are half submerged by it. In the vicinity of the Indian village of Santa Anna, lower down in the same valley, the wind-blown sand has in recent years completely covered the farm lands of the tribe, so that the government was finally compelled to give them another reservation across the Rio Grande at Bernalillo.

5. At the Indian village of San Felipe in the valley of the Rio Grande, the settling of dust particles blown from the almost barren mesa adjacent is very noticeable.

6. Around the White Thunder camp of the Rosebud Indian Reservation, in the valley of White Thunder Creek, S. D., the soil is a clay; yet the sands from the Arikaree strata some six miles away are blown by every wind storm completely across the valley and even into the houses, so that after every heavy wind one can write in the sand on the window sills inside the houses.

7. Last year I laid down a board in some grass on the lee side of Pacific street ridge in the village of LaPush, Wash., near the beach of Quillayute Bay. Several months later I looked at the board and found it covered with one eighth of an inch of beach sand which had been blown about half a mile and over the above ridge, which is completely covered with grass.

Various means have been adopted to prevent the movement of soil by winds. The Moqui Indians do not plow their soil at all. They simply dig a hole in the sand for each hill of corn and then tramp down the dirt with their feet to keep it from blowing away. Many people in the southwest do not plow their ground until the windy season is over. And in the irrigated regions the ground is flooded as soon as plowed. To prevent the movement of soil by the wind as well as to level the land, the farmers of the plains region roll their land or crush it with a weighted plank float. So far as the writer knows, these are the only means now used by farmers to keep the soil from being blown away by the winds. But others could be employed.

Groves and hedges could be planted on the windward side of fields to break the winds. Also, at least for small farms, wind breaks like those used by railroads as protection against snow and sand drifting in cuts could be used to advantage, especially in regions too dry for the rapid growth of trees and hedges.

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#### A FAULT IN AN ESKER

ABOUT three quarters of a mile from East Templeton, Mass., on the southeast side of the direct road from that town to Gardner, there is a cutting in one of the large, esker-like ridges typical of this locality. The deposit consists of distinct layers of fine, compact sand, with a few beds of gravel, of which the pebbles vary in diameter from less than an inch to six inches.

Where the stratification is well marked, near the northeastern end of the pit and about half way up the slope, the horizontal beds are found to terminate abruptly against a flat, narrow layer of sand and gravel, striking roughly east and west and dipping  $63^{\circ}$  northwards. This layer can be clearly discerned for a distance of more than twenty feet on the face of the pit; but above and below, like the beds which it traverses, it is covered by loose slide material.

That this layer may represent a fault zone, analogous to a fault breccia, in which the slipping destroyed original structures, is suggested by two facts: First, the beds are displaced; where they are best shown, the order of coarse gravel (2 ft.), fine, cross-bedded sand (2 ft.), fine gravel (4 in.), and very fine, compact sand (10 in.), on the south, is repeated, on the north side of the fault, about two feet lower. Second, the strata on the south side are plainly bent downwards next the fault.

Whether this dislocation is restricted to the glacial deposit only, or extends down into bed rock, can not be determined, for no bed rock outcrops here. The first supposition (of limitation to the deposit) seems most reasonable, since (1) the plane of the displacement is near the steepest slope of the deposit; (2) it strikes more or less parallel with the length of the

deposit; and (3) post-glacial faults are generally of only a few inches displacement. Possibly the slipping was due to the removal of sand by water running below the surface. Certainly all the evidence militates against the assumption that the digging of the pit could have been the cause.

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BUFO FOWLERI (PUTNAM) IN NORTHERN GEORGIA

In the September issue of SCIENCE for 1907, I discussed the range of Fowler's toad to some extent, according to my own observations. An opportunity to spend the spring and summer of 1908 in the counties of Gwinnett and Jackson in northern Georgia has enabled me to make further observations concerning this interesting and apparently little understood toad.

In this region throughout March I heard the occasional, prolonged trills of the so-called common toad (*Bufo lentiginosus*). By the first of April these notes had become quite silenced, and the distinct chorus of congregations of Fowler's toads had begun. I first noticed these toads singing on the evening of March 26, although I think the first singers had appeared somewhat earlier. It was interesting to note that the voices of Fowler's toads were never heard with the appearance of cool, chilly nights, although the trilling of the common toad continued. Throughout the early spring, this contrast in the occurrence of the two notes, with respect to temperature changes, was very marked.

Fowler's toad in this region of Georgia is an exceedingly abundant species. Throughout the months of April, May and June its droning cries are heard in thousands along certain streams. At this season the females are laying their long, bead-like strings of eggs in the water, attended by hosts of noisy males. Especially during the spawning season, the females seem to be greatly outnumbered by the males.

During the last week of May, the streams and pools where the eggs had been laid, were alive with tadpoles in different stages of development. About the middle of June, many

of these had developed into tiny toads which were hopping along the banks, and in a few days every tadpole had disappeared as if by magic. A few evenings later, there was a noticeable increase in the number of males in voice along this stream. On visiting the locality, I was interested to find the females again laying eggs in great quantities, accompanied by many males. It would seem from this that these toads may have several well-defined egg-laying periods in a season.

After the spawning season these toads leave the water and take up quarters in the fields and pastures. During the day they generally remain quiet beneath stones, logs and bunches of grass. I find them very frequently in deep gullies. Here also I have found their eggs in the transient pools following showers. Several times I have found these toads buried to the eyes in sand greatly heated by an intense sun. In gullies and banks by the roadsides, the horizontal holes left by the decay of tree-roots, are favorite hiding places for these toads during the day. Several sometimes occupy the same tunnel, and may be seen peering out with expressions evincing serenity and contentment. Fowler's toads are rather inclined to be social in their habits. Last summer, near Hartford, Conn., I noticed a great stone door-step under which fifteen or twenty of these toads had taken up summer quarters. Every evening throughout the summer they would appear, one by one, and hop in a long line, up the walk leading into the fields.

I find considerable variation in the size, markings and coloration of Fowler's toad. The general coloration varies from a bright reddish brown to a dark grayish brown. Beneath, I have found no markings whatever, in either sex.<sup>1</sup> In truth, in this region of Georgia every toad examined was, for this and other reasons, apparently a Fowler's toad.

The usual note of Fowler's toad is a brief, penetrating, droning scream. Only once have I heard a decided departure from this. I heard this note late in April, in Gwinnett Co.,

<sup>1</sup> A single small, dark spot in the center of the breast of the males is the only marking I have ever observed beneath.